Ascotel IntelliGate Telecommunication System

AIP 6350 / Office 35IP

System Manual

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1 Safety Instructions

To exclude risk to people or goods, the following instructions must be observed.

1.1 About the Products

Purpose

The products AIP 6350 and Office 35IP expand the functionality of Ascotel IntelliGate and are to be used for that purpose exclusively.

User group

All installation and maintenance work is to be carried by authorized qualified personnel only.

Necessary documentation

To ensure that the products are handled correctly and safely, it is essential that you consult this Manual. The instructions and notes contained in the Manual must be observed.

Besides this System Manual the following documents are also required:

- Ascotel IntelliGate System Manual
- Office 35IP Operating Instructions

Data protection

Uncoded phone calls in the network can be recorded and played back using the appropriate equipment. For this reason it is preferable to use your own leased lines for WAN links or to encode the IP packets using for example VPN (Virtual Private Network).

For the port configuration of the firewall see the Chapter "Applications, Protocols and Ports", page 53.

1.2 Guidelines to this System Manual

Purpose

This System Manual describes the products AIP 6350 and Office 35IP, and how to handle them. Other AIP versions are not described here. Please refer to the separate product documents.

Target readership

This System Manual is aimed at the persons listed under "User group" (see page 5).

Conventions

The abbreviation "AIP" is used throughout the text instead of the full designation "AIP 6350".

The term "IP terminal" is used throughout the text instead of the designation "Office 35IP".

The abbreviation "AIP card" is used throughout the text instead of the full designation "AIP 6350 expansion card".

Warnings

Special pictograms are used to signal areas of particular risk to people or equipment.

Hazard:
Failure to observe information identified in this way can put people and hardware at risk through electrical shock and short-circuits/defects respectively.

Warning:
Failure to observe information identified in this way can cause the product or module to malfunction.

Note:
Failure to observe information identified in this way can lead to equipment faults or malfunctions or affect the performance of the system.

2 System Description

The joint use of the two IP components, namely the AIP 6350 IP interface card and the Office 35IP system terminal, makes the IP infrastructure available to telephony, and expands the Ascotel IntelliGate platform to the IP data network.

The Office 35IP system terminal is a fully fledged IP terminal with the complete range of features of an Office 35. It can be operated anywhere in the IP data network, provided the connection to the PBX complies with the quality criteria required for VoIP (Voice over IP).

Like any Office system terminal, Office 35IP communicates with the PBX via the AD2 protocol. The features and user prompting are identical to those of the Office 35.

The AIP 6350 is the PBX's Ethernet interface to the Office 35IP system terminals. The expansion card from the AIP family has been designed specially for this application.

Both the Office 35IP and the AIP 6350 are configured and updated using the AIMS management software. All the settings can be made both offline and online with the usual operating interface.

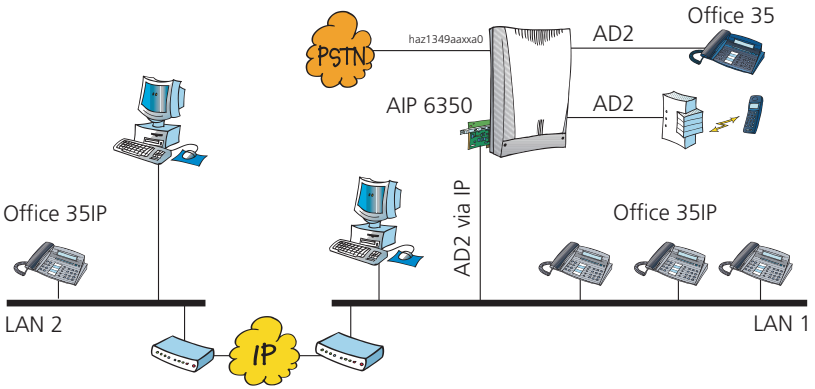


Fig. 1: Office 35IP and AIP 6350 expand the Ascotel IntelliGate platform to the IP network

This key expansion option translates into a whole range of advantages for the user:

- Networked, remote workstations can be integrated at low cost into the internal telephone system, without compromising the ease with which phone calls are made. Unlike a connection via the public telephone network, no call charges are incurred and users can be reached as internal subscribers.

- Many features that are restricted when a remote subscriber is integrated as a virtual subscriber can be used to the full, e.g. call diversions, Voice Mail, Courtesy, text messages, announcements.

- In the case of smaller branch offices the customer can dispense with using an additional PBX in the branch.

- When expanding an existing infrastructure with new connections for PC and phones there is no need to expand the phone lines.

Note:
As a result of the expansion of the Ascotel IntelliGate platform to the IP data network the network used becomes part of the Ascotel IntelliGate system. The communication quality therefore depends directly on the network quality (in the same way as the road network influences the delivery quality of a haulage company).

3 Initial Installation

This Chapter guides you through the processes used for expanding a PBX with Office 35IP terminals (referred to in the following as IP terminals). With the aid of the reference model you will be taken through the stages of planning, installation, configuration and commissioning.

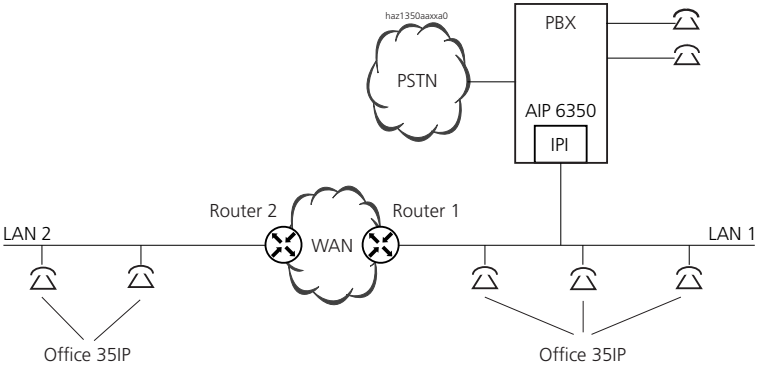


Fig. 2: Reference model

3.1 Planning

The aim of the planning phase is to provide all the data necessary for installing, configuring and putting the system into operation.

The following Instructions assume that an Ascotel IntelliGate telecommunications system is already in operation, with a networked organisational structure.

3.1.1 Designing the System

The following describes the procedure for defining the number of IP terminals you want and the AIP expansion cards required for this purpose (see "Expansion Card AIP 6350", page 29):

1. Specify the number of IP terminals.
2. Determine the number of voice channels required on the AIP based on the anticipated traffic volume. Please note that during a call connection each IP terminal involved requires a call channel to the PBX, as each connection is routed via the PBX (Fig. 3).
3. Determine the number of AIP cards required (see "Overview of System Limits", page 48):
   – The maximum number of AIP cards that can be fitted depends on the PBX model.
   – One AIP card supports up to 16 IP terminals.
   – The maximum number of simultaneously active voice channels per AIP card depends on the DRS modules fitted.
4. Assign each IP terminal to an AIP card (each IP terminal must later be permanently assigned to a fixed AIP card during addressing).
5. Check to make sure that the PBX system limits are not exceeded (see "Overview of System Limits", page 48):
   – Number of admissible AIP cards.
   – Number of admissible AD2 interfaces. One AIP card occupies 16 AD2 interfaces (see Ascotel IntelliGate System Manual).
   – Number of admissible subscribers on the PBX (see Ascotel IntelliGate System Manual)

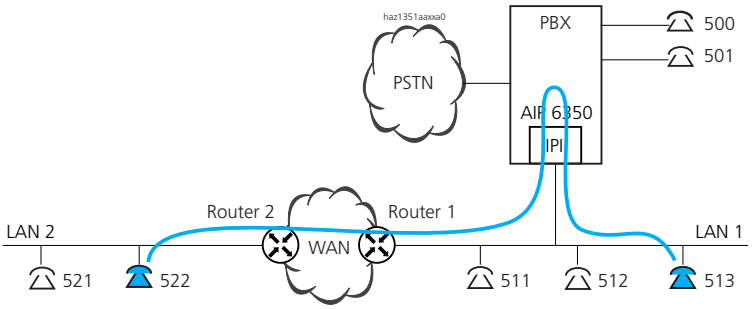


Fig. 3: Call connection between 2 IP terminals

Tab. 1: System design based on the example of the reference model

Design		Explanation
PBX model	Ascotel IntelliGate 2025 / 2045 / 2065	
IP terminals	5	
Voice channels	5	All terminals are able to make and receive calls simultaneously
AIP Cards	1	
DRS modules	1 DRS-08	max. 8 voice channels

3.1.2 Assigning Call Numbers and IP Addresses

The following describes the procedure for sketching the IP terminals into your network's current layout and assigning the call numbers and IP addresses.

Note:
The system operates with permanently assigned IP addresses. DHCP is not supported.

1. Sketch the IP terminals into your network's current layout.

   All the routers, gateways, firewalls and WAN links between AIP and the IP terminals should be visible along with their IP addresses and subnet masks.
2. Enter the call numbers of the IP terminals.
3. Enter the IP addresses of the IP terminals and AIP cards.

   The IP addresses must not have a relation to the call numbers. For the initialisation values of the IP addresses see the Chapter "Initialisation Values for IP Addresses", page 48.
4. For each IP terminal enter the IP address of its allocated AIP card.
5. Enter the gateway address for each IP terminal. The gateway address is the terminal-side IP address of the router that forms the transition to another LAN area with IP terminals.

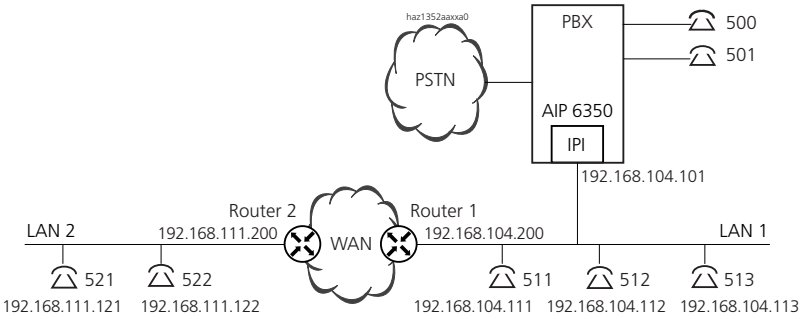


Fig. 4: Call numbers and IP addresses on the reference model

Tab. 2: Addressing the IP terminals based on the example of the reference model

Call number	IP address	Subnet mask	AIP card	Gateway address
511	192.168.104.111	255.255.255.000	192.168.104.101	192,168,104,200 (router 1)
512	192.168.104.112	255.255.255.000	192.168.104.101	192,168,104,200 (router 1)
513	192.168.104.113	255.255.255.000	192.168.104.101	192,168,104,200 (router 1)
521	192.168.111.121	255.255.255.000	192.168.104.101	192,168,111,200 (router 2)
522	192.168.111.122	255.255.255.000	192.168.104.101	192,168,111,200 (router 2)

3.1.3 Network Planning

The following describes the procedure for checking your network and planning the type of communications between AIP and the IP terminals.

Note:

– Please note that the expertise of an experienced network engineer is crucial for assessing and optimising the network environment.
– We strongly recommend that you examine the network using a special check-list, which you can download from our support page (asco-tel.ascom.ch). Our specialists will be happy to assist you on the basis of the completed check-list.

1. Check whether your network environment complies with our recommendations ("Bandwidth Management", page 41); if not, please take the necessary measures to comply with the requirements.
2. Determine the prioritisation method in accordance with the Chapter "Prioritising", page 42.

   With regard to initialisation values ToS is activated and CoS deactivated (TOS is recommended if the voice connection is to be set up via a WAN link. CoS prioritises voice traffic at the level of the switches).
3. Plan the bandwidth control in accordance with the Chapter "Bandwidth Management", page 41.

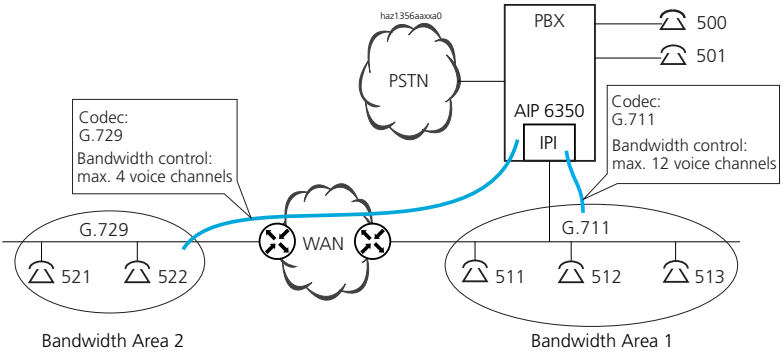


Fig. 5: Network planning based on the reference model

3.2 Installation

The aim of the installation phase is to:

- Fit the AIP card(s) and connect them to the network.
- To connect the IP terminals to the power supply and the network.
- Enter the addresses on the IP terminals.

Proceed as follows:

1. Install the AIP card(s) as indicated in the instructions in the Chapter "Expansion Card AIP 6350", page 29.
2. Install the IP terminals as indicated in the Chapter "IP Terminal Office 35IP", page 20.

3.3 Configuring

The aim of the configuration phase is to define and set all the system parameters using AIMS.

You can carry out the settings online directly on the PBX or prepare all the settings in the offline mode and then load them onto the PBX. To do so please refer to the AIMS online help.

You need to have System Manager or Installer authorisation to have access to the configuration data.

3.3.1 Adding AIP Card(s) and IP Terminals

The following describes the procedure for complementing the AIMS master data with the AIP cards and IP terminals.

1. In offline mode add the required number of AIP cards (card configuration; CM_1_1_2). Make sure the slot selected in AIMS matches the slot actually used in the system.

   Once you have stored your inputs, AIMS will create 16 virtual user-network interfaces[1)] with 2 connection possibilities each (MSN 1 and MSN 2) for each AIP card. As a preconfiguration process AIMS automatically creates subscriber data including call numbers on all MSN-1 connections.
2. Assign the names and correct call numbers to the subscribers preconfigured by AIMS (CM_1_1_3_Interface Configuration).
3. Assign the IP addresses to the subscribers in accordance with the layout used in the planning phase (CM_1_4_5_IP Terminals). Tab. 3 shows the settings based on the example of the reference model.
4. Enter the IP address and subnet mask of the AIP card (CM_1_4_5_AIP Card). Tab. 4 shows the settings based on the example of the reference model

Tab. 3: Assignment of user-network interface – IP address based on the example of the reference model

IP Terminal	User-network interface	IP address
511	5.1-1	192.168.104.111
512	5.2-1	192.168.104.112
513	5.3-1	192.168.104.113
521	5.4-1	192.168.111.121
522	5.5-1	192.168.111.122

Tab. 4: IP address and subnet mask of the AIP card based on the example of the reference model

AIP card 1	IP address	Subnet mask
1	192.168.104.101	255.255.255.000

1) Only 8 subscribers are preconfigured on the Ascotel IntelliGate 2025. Additional subscribers have to be created manually on the MSN 2 connection of the user-network interfaces.

3.3.2 Configuring the Default Gateway

To be able to reach IP terminals in other LAN areas, you need to enter the IP address of the router via which the LAN area of the AIP is to be exited (default gateway). This entry is superfluous if AIP and all the IP terminals are located in the same LAN area.

You can define different default gateways for each individual IP terminal or for groups of IP terminals. As only one default gateway is used in most cases, in the following enter one default gateway for all registered IP terminals. For more information please refer to the Chapter "Static Routes", page 46:

1. Create a static route (CM_1_4_5_Static Routes).
2. Enter the IP address "0.0.0.0".
   – "0.0.0.0" covers all the registered IP terminals.
3. Enter the subnet mask "0.0.0.0".
   – "0.0.0.0" covers all the LAN areas and subnets.
4. Enter the IP address of the default gateway.

Tab. 5: Default gateway based on the example of the reference model

Static route	IP address	Subnet mask	Default gateway
1	0.0.0.0	0.0.0.0	192.168.104.200

3.3.3 AIP Configuring

The following describes the procedure for configuring AIP based on the data determined during the planning phase ("Network Planning", page 13).

1. Check the settings of the general network parameters (CM_1_4_5_AIP Cards). See also Tab. 6.
2. Configure the parameters for prioritising the voice data (CM_1_4_5_AIP cards). See also Tab. 6.
3. Configure the parameters for bandwidth control (CM_1_4_5_IP Terminals and CM_1_4_5_Bandwidth Areas). See also Tab. 17.

Tab. 6: AIP Settings based on the example of the reference model

AIMS menu	Parameters	Parameter values[1)]
CM_1_4_5_AIP Cards	On/Off	On
	Ethernet	Automatic
	VLAN	1
	Dejitter Buffer	Automatic
	Buffer Size	60

1) Here they all correspond to the initialisation values

3.4 Commissioning

The aim of commissioning is to obtain a correctly functioning system. For this we suggest a functional test.

3.4.1 Checking the Installation

Check the following points before starting with the functional test:

- Have the IP terminals been successfully commissioned as indicated in the Chapter "IP Terminal Office 35IP", page 20?
- Has the AIP card been successfully commissioned as indicated in the Chapter "Expansion Card AIP 6350", page 29 (Link LED lit)?
- Has the AIMS configuration been carried out in full and has the configuration data been loaded onto the PBX?
- Has the configuration of the switches and routers been adapted?

3.4.2 Functional Test

For the functional test we recommend that you put the system into operation on a trial basis and check its operational suitability using a structured feedback from all users. Proceed as follows:

1. Check the following points on each IP terminal:
   – Do you obtain a dial tone when you pick up the handset?
   – Are you able to set up a connection from the terminal?
   – Can a connection to the terminal be set up?
2. In the initial operating phase check the call capacity and the speech quality by asking the users to inform you of their experiences.

If the result is not satisfactory, have the network checked by specialists.

3.4.3 Troubleshooting

Try and ascertain whether the cause of the error originates in the PBX, the AIP, the network, the IP terminal or in the interplay between these components. If the fault appears to lie with.

- .. the PBX, please refer to the Ascotel IntelliGate System Manual.
- .. the network, call in a specialist to help you check the network configuration and the network-related settings.
- .. the AIP or an IP terminal, check all the settings and connections as explained this Manual.

The table below lists the most common error messages displayed on the IP terminal and provides pointers on how to remedy them.

Tab. 7: Troubleshooting based on the display on the IP terminal

Error indication	Error	Measures
"Could not register"	IP connection between AIP card and IP terminal cannot be set up	Check AIP: • Functionality check in accordance with chapter "Expansion Card AIP 6350", page 29). • IP address AIP • IP address of IP terminal • IP Address of default gateway Check IP terminal: • IP Address of default gateway • IP address AIP • Own IP address Check network: • Switch configuration • Router configuration • Firewall configuration
"No connection to AIP"	Ethernet connection between AIP card and IP terminal cannot be set up	
"Too many IP-Phones"	The AIP card is already fitted to the system limit with other IP terminals.	Can PBX be expanded with other AIP cards?
"Trying to register" or "Not configured"	No subscriber data allocated	Check AIP/PBX: • Allocation of IP address to port • Allocation of port to call number
"Unknown error"	General system error	Contact support
Display does not respond	Local fault on IP terminal	Restart IP terminal

4 IP Terminal Office 35IP

Like any Office system terminal, the system terminal Office 35IP communicates with the PBX via the AD2 protocol. The features and user prompting are on the whole[1)] identical to those of the Office 35.

4.1 Expansion Options

2 expansion keypads and one alpha keyboard or 3 expansion keypads can be connected to an Office 35IP (see Operating Instructions for the Office 35IP).

4.2 Installation

The Office 35IP has the following external connections:

- Network connection
- PC connection
- Mains power supply unit connection

The terminal has an integrated switch (100BaseT), which can be used for connecting the workstation computer. This means there is no need to install a separate network connection point to operate the terminal.

Note:
The integrated switch is to be used exclusively for the operation of a PC.
– Do not connect any other terminals such as IP terminals, switches, hubs, printers or servers.

1) The system limits are described in chapter "Overview of System Limits", page 48.

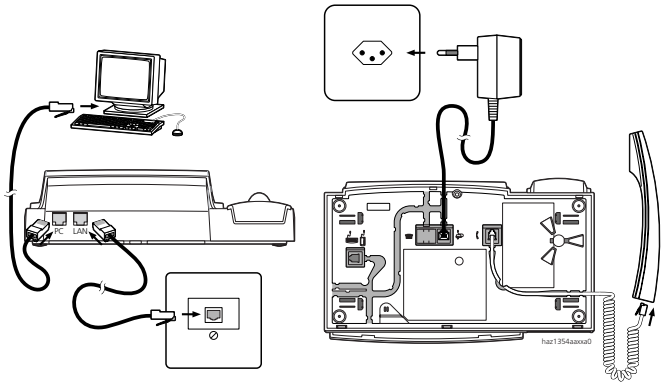


Fig. 6: Connections on the Office 35IP

To install the Office 35IP proceed as follows:

1. Connect the IP terminals to the power supply.

   To do so, first plug the mains connector into the connection socket and only then connect the RJ45 connector to the terminal's socket.

2. Address the IP terminals in accordance with the instructions in the chapter "Configuring IP Addresses", page 22.

3. Connect the IP terminals to the network.

As soon as the terminal is connected to the network, it will attempt to register with the AIP card (see "Registering Process", page 24).

4.2.1 Power Over LAN

If your network supports Power-Over-LAN as per IEEE 802.3af, the Office 35IP can be powered via the network connecting cable and the mains power supply-unit is not required (PIN 4/5 and 7/8 on the RJ7 connection).

If the IP terminal is connected to the power supply both via Power over LAN and the mains power supply unit, it will be powered by whichever source was connected first.

4.3 Configuration

Equipment and subscriber-specific settings can be made by the user himself via the terminal or by the system administrator via AIMS. These settings are described in the Operating Instructions for the Office 35IP.

The IP addresses are entered locally on the terminal by the Installer or System Administrator.

Note:
The IP addresses are to be entered before the IP terminal is connected to the network.

The IP addresses remain stored even when the equipment is disconnected. This means that it is not necessary for the IP terminals to be configured on site; instead they can be configured prior to the installation.

The menu prompting for entering the IP addresses is only available in English.

4.3.1 Configuring IP Addresses

Proceed as follows to configure the IP addresses:

1. Press the END key until the display reads "Offline Mode".

Note:
Calls cannot be conducted in offline mode.

2. Use the Foxkey to select "Administration".
3. Scroll with the key MENU to the desired IP address (see Tab. 8).
4. Select the desired IP address using the Foxkey.
5. Select "Change", to adapt the IP address:
   – Enter all 12 decimal places of the IP address (so for IP address 192.16.3.101 for example, enter the digit sequence "192.016.003.101").
   – Use the keys to navigate to the left and right.
6. Confirm the input with "OK".
7. Adapt the other IP addresses in the same way.
8. Press the END key, if you adapted all IP addresses. The display reads "Restart Office 35IP?"

9. Select "Yes" to activate the settings.

   The IP terminal registers with the AIP card, providing it is already connected to the network, and the offline mode is exited.

   If the IP terminal is not yet connected to the network, it will register with the AIP card as soon as it is connected.

Tab. 8: IP Addresses in the Local Configuration Menu

IP addresses	Explanation
IP-Adress	IP address and subnet mask of the IP terminal
GW-Adress	Gateway address: The IP router address, is the terminal-side IP address of the router that forms the transition to another LAN area with IP terminals (see Tab. 9). If all the IP terminals are in the same LAN area, 000.000.000.000 can be used as the gateway address (first-start value).
AIP-Adress	IP address of the AIP card

Tab. 9: Gateway addresses using the example of the reference model

LAN area	IP terminals	Gateway address
1	511, 512, 513	192,168,104,200 (router 1)
2	521, 522	192,168,111,200 (router 2)

4.4 Initialization and Restart of an IP Terminal

Restarting the IP terminal initializes the local software and re-registers the IP terminal with the AIP card.

Proceed as follows to carry out a restart:

1. Press the END key (END) until the display reads "Offline Mode".
2. Press the (MENU) key.
3. Use the Foxkey to select "Restart" and "Yes".

Alternatively you can also unplug the power cord under the terminal and then reconnect it.

Note:
Calls cannot be conducted during the restart.

Initializing the IP terminal sets all the addresses to the initialization values (see "Initialisation Values for IP Addresses", page 48).

Proceed as follows to carry out an initialization:

1. Initiate a restart. The boot procedure is initiated.
2. Press simultaneously the key (MENU) and the key "0", 5 seconds after start of the boot procedure. Hold the key until the display reads "Set factory defaults".
3. Release the keys. The IP terminal is started with the initialization values.

4.5 Registering the IP Terminal with the System

The IP terminal registers on the system itself after a restart (see "Initialization and Restart of an IP Terminal", page 23).

4.5.1 Registering Process

The IP terminal registers with the AIPcard whose IP address is configured under "AIP Address" in the terminal, and notifies it of its own IP address.

The AIP software checks whether the same IP address has already been assigned to a user-network interface with subscriber data in the AIMS configuration, and responds as follows depending on the result:

- The IP address has already been assigned to a user-network interface:
  - The IP terminal is assigned to the same user-network interface.
  - The user-network interfaces including user name and call number are available to the terminal.
  - The registering process is completed.

- The IP address has not been assigned to any user-network interface:
  - The IP terminal is assigned to the next available user-network interface with preconfigured subscriber data (user-network interfaces without assigned subscriber data are not active).
  - The preconfigured subscriber settings including user name and call number are available on the terminal, and the registering process is completed.

4.5.2 Registering Strategies

The registering process allows 2 strategies for registering IP terminals with the system:

- The systematic strategy
- The Plug-and-Play Strategy

4.5.2.1 Systematic Strategy

The assignment of the IP address to user-network interface and phone number is determined before the installation.

Use this procedure is you are planning the installation systematically:

1. Fitting and registering the AIP card.
2. Use AIMS to enter the IP address of the AIP card.
3. Use AIMS to enter the user name and phone number and assign them to the user-network interfaces.
4. Use AIMS to assign the IP addresses of the IP terminals to the user-network interfaces.
5. Configure the local IP addresses in the IP terminals.
6. Connect the IP terminals to the network. The IP terminals are registered and their configuration is then completed.

This procedure is also used in the Chapter "Initial Installation", page 9.

4.5.2.2 The Plug-and-Play Strategy

The definitive assignment of the IP address to user-network interface and phone number is determined after the installation.

1. Fitting and registering the AIP card.
2. Use AIMS to enter the IP address of the AIP card.
3. Configure the local IP addresses in the IP terminals.
4. Connect the IP terminals to the network.

   The IP addresses of the IP terminals are assigned one after the other to the available user-network interfaces and then registered.

   The IP terminals are ready to operate. However, you will not know in advance which phone number is assigned to an IP terminal.
5. Checking the phone numbers on the IP terminals.
6. Adapting the phone numbers and the remaining subscriber data using AIMS.

4.6 Handling the IP terminals

This Chapter describes how to replace or move IP terminals during operation, and how to expand the system with other IP terminals.

4.6.1 Replacing an IP terminal

The following describes the procedure for replacing an IP terminal. For this the PBX does not have to be taken out of operation:

1. Unplug all the connectors on the IP terminals.
2. Install the replacement terminal as indicated in the Chapter "IP Terminal Office 35IP", page 20.
   Make sure you enter the same IP addresses as those configured in the terminal you have replaced.
3. Carry out a connection check.

4.6.2 Connecting an IP Terminal Elsewhere

The following describes how to change the point at which an IP terminal is connected without changing the call number, subscriber name or the terminal settings. For this the PBX does not have to be taken out of operation:

If the IP addresses of the IP terminal, the default gateway and the AIP card can be taken over unchanged, proceed as follows:

1. Unplug all the connectors on the IP terminals.
2. Install the IP terminal in accordance with chapter "Installation", page 20, without adapting the IP addresses.
3. Carry out a connection check.

If the IP addresses must be adapted, proceed as follows:

1. Unplug all the connectors on the IP terminals.
2. Adapt the IP addresses in the AIP configuration with AIMS.
3. Use AIMS to check the settings of the set codec, the allocated bandwidth area and the allocated static routes.
4. Install the IP terminal in accordance with chapter "Installation", page 20 and adapt the IP terminal in accordance with chapter "Configuring IP Addresses", page 22.
5. Carry out a connection check.

4.6.3 Expanding the System with IP Terminals

The following describes how to expand the system with additional IP terminals. For this the PBX does not have to be taken out of operation:

1. Check to make sure that none of the following limits are exceeded as a result of the expansion:
   - Admissible number of system terminals on the PBX (a PBX upgrade may be necessary)
   - Admissible number of IP terminals per AIP card (another AIP card may be necessary).
   - Maximum number of simultaneously active voice channels on the AIP card (the DRS modules may have to be removed).
   - Maximum number of simultaneously active voice channels in the bandwidth areas concerned (bandwidth may have to be increased).
2. Specify the call numbers and IP addresses of the new terminals and configure them in the PBX using AIMS.
3. Install the IP terminals as indicated in the Chapter "IP Terminal Office 35IP", page 20.
4. Use AIMS to check the settings of the set codec, the allocated bandwidth area and the allocated static routes.
5. Carry out a connection check.

5 Expansion Card AIP 6350

The extension card AIP 6350 is identically as the extension card AIP 6400, however is provided with another software.

5.1 AIP Card

AIP cards are installed in an Ascotel IntelliGate 2025, 2045 or 2065. Depending on the system one or more AIP cards can be used.

Tab. 10: Number of AIP cards supported

PBX	Possible number of AIP cards
Ascotel IntelliGate 2025	1
Ascotel IntelliGate 2045	2
Ascotel IntelliGate 2065	4

The AIP cards fitted can be loaded with the same or with different AIP software. If they are loaded with the same AIP software, the maximum number of processable voice channels is added up.

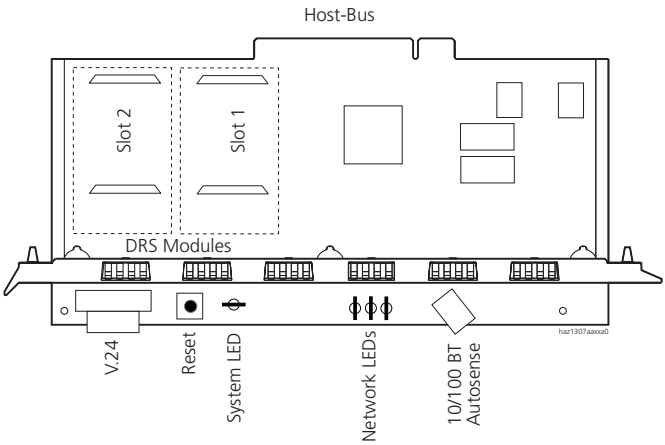


Fig. 7: AIP card with DRS module slots

5.2 DRS Module

DRS modules are AIP-specific modules that are fitted to the AIP card. An AIP card contains 2 slots for DRS modules.

DRS modules are required for the real-time processing of voice data. Two DRS modules of different sizes are available:

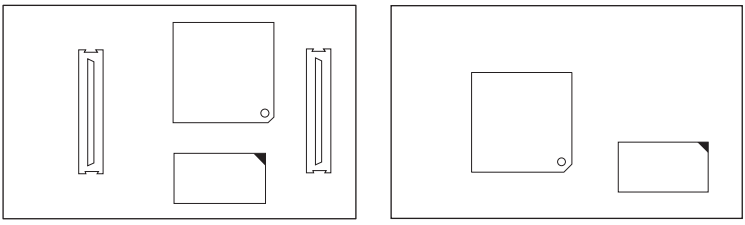
- The DRS-04 module is capable of processing up to 4 voice channels simultaneously
- The DRS-08 module is capable of processing up to 8 voice channels simultaneously

Tab. 11: Component placement variants for DRS modules and number of voice channels

DRS-04	DRS-08	Maximum number of voice channels per AIP card
1	-	4
2	-	8
-	1	8
1	1	12
-	2	12 (!)

It is not significant how the module slots are fitted.

Notes:
A maximum of 12 voice channels can be processed for each AIP card.



Front view Rear view

Fig. 8: DRS module (rear view with components for DRS-08 only)

Notes:
– An AIP card has to be fitted with at least one DRS module.
– AIP cards are supplied without DRS modules. Please order separately.

5.3 Component Placement Example

An Ascotel IntelliGate 2065 is fitted with 3 AIP cards:

Tab. 12: Ascotel IntelliGate 2065 with 3 AIP cards

	DRS-04	DRS-08	Voice channels	IP terminals
AIP card 1	1	1	12	16
AIP card 2	1	1	12	16
AIP card 3	1	-	4	16
Total	3	2	28	48

5.4 Installation of the AIP Card

Warning:
During the entire installation procedure, it is mandatory to observe the electrostatic discharge (ESD) precautions. The creation of an anti-static environment is highly recommended.

Fitting the PBX with an AIP card:

1. Fitting an AIP card with DRS modules.
2. Disconnect the PBX from the power supply.
3. Fit the AIP card into the PBX as described in the Chapter "Fitting Expansion Cards" in the "Installation" Part of the Ascotel IntelliGate System Manual.

Hazard:
- Expansion cards can be damaged by electrical voltage. Cards and modules are to be fitted or removed only once the PBX is disconnected from the power supply!
- Fitting cards and modules incorrectly can damage the hardware, resulting in malfunctions. The instructions in the Ascotel IntelliGate System Manual must therefore be followed to the letter.

The AIP card is automatically registered during a restart or initialization.

5.5 Connection on the AIP Card

The AIP card is connected by a switch to the network. The PBX does not have to be switched off for this.

For the connection the following cable is to be used:

- Straight (1:1 through-connected) twisted-pair Ethernet cable
- Category 5 or higher
- With RJ-45 connectors at both ends.

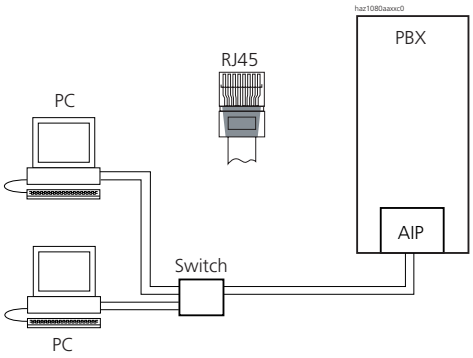


Fig. 9: PC switch – AIP card connection

Tab. 13: Pin assignment of the straight cable

	Switch			AIP	
RJ45 Connector, 8 pin	Signal	Pin	Data flow	Pin	Signal
	Tx+	1	haz1081aaena0 →	1	Rc+
	Tx-	2	→	2	Rc-
	Rc+	3	←	3	Tx+
	Rc-	6	←	6	Tx-

5.5.1 V.24 Connection

The serial interface (V.24) enables support specialists to monitor the traffic data. It has no function in normal operation.

A crossed cable (null modem cable) is used to connect the PC to the AIP card via the serial interface (V.24).

Tab. 14: Pin assignment of the crossed cable

Signal	DTE D-Sub-9 Socket	Data flow	DTE D-Sub-9 Socket	DTE D-Sub-25 Socket	Signal
TXD	3		3	2	TXD
RXD	2		2	3	RXD
SGND	5		5	7	SGND
	AIP		PC	PC	

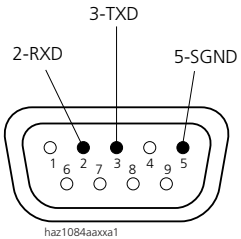


Fig. 10: Pin assignment on the D-Sub-9 connector

Flow control on the PC is to be set on "XON / XOFF". Hardware handshake RTS / CTS is not supported.

5.6 Commissioning the AIP Card

When the PBX is switched on with a newly installed AIP card, the green system LED on the AIP card should start flashing (see Fig. 7, page 29). The network LEDs have the following functions:

Tab. 15: Functions of the LEDs on the AIP card

LED name	Colour	Function
Link	green	• lit when connected to the network • flashes irregularly during data exchange
100 Mbit	green	• lit when connected to a 100 Base-T network • off when connected to a 10 Base-T network
Collision	red	Collision detection

The correct installation of the AIP card on the network can be tested from a PC using the Ping utility. To operate the Windows Ping utility proceed as follows:

1. Select "Run" from the Start menu.
2. In the input field enter the Ping command: "ping <IP address>".
3. Confirm with "ENTER".

If there is no response to the Ping command, the AIP card is not detected. There may be several reasons for this:

- Faulty physical connection between the AIP card and the network.
- The IP address or subnet mask of the PC or of the AIP card is incorrect or not identical.
- There is a malfunction in the network or on the PC.

After successful commissioning, AIP can be configured using AIMS.

5.6.1 Changing the IP Address of the AIP Card via V.24

The IP and subnet address of the AIP card can be corrected without a password prompt via the V.24 access.

1. Start a hyperterminal session
2. Enter the following command line according to Tab. 16 and press "Enter":
3. Enter "reboot" and press "Enter"
   The card is started and the modified IP address is read in.

Tab. 16: Important Terminal Command Lines

Function	Command line
Show current IP address	ipaddr eth0 show
Change IP address	ipaddr eth0 <IP address>
Show current subnet mask	ipmask eth0 show
Change subnet mask	ipmask eth0 <subnet mask>

5.7 Handling the AIP card

This Chapter describes the procedure for replacing or offsetting an AIP card, and what happens with the AIP configuration data during this process.

5.7.1 Fitting and Removing an AIP Card

Follow the instructions in the Ascotel IntelliGate System Manual (Part 7, "Fitting and Removing Cards") for fitting or removing an AIP card on a PBX in operation.

Hazard:

– Expansion cards can be damaged by electrical voltage. Cards and modules are to be fitted or removed only once the PBX is disconnected from the power supply!
– Fitting cards and modules incorrectly can damage the hardware, resulting in malfunctions. The instructions in the Ascotel IntelliGate System Manual must therefore be followed to the letter

5.7.2 Replacing an AIP Card

The following describes how to replace an AIP card:

1. Use an AIMS Download to save the AIP configuration data (backup).
   (As this may no longer be possible if the card is defective, it is advisable to keep backups of the latest configuration on AIMS at all times.)
2. Replace the AIP card as described in the previous Chapter.
3. Start the PBX.
4. Log in with AIMS on-line on the PBX. The message "HW configuration has been changed" appears.
5. Start the configuration manager and select the card configuration (CM_1_1_2).
6. Select the replaced card in the column "Card (system)" and click on "Confirm System Configuration".
7. Switch onto AIP configuration (CM_1_4_5_AIP cards), check the configuration and unlock the card ("AIP Card On/Off").
8. Carry out a functional check.

5.7.3 Fitting an AIP Card to a Different Slot

The following describes how to change the slot of an AIP card:

1. Use an AIMS Download to save the AIP configuration data (backup).
2. Remove the AIP card as described in the Chapter "Fitting and Removing an AIP Card", page 36.
3. Fit the AIP card in its new slot as described in the Chapter "Fitting and Removing an AIP Card", page 36.
4. Start the PBX.

   The AIP configuration data is retained. The port numbers of the interfaces and their allocation to the IP addresses of the IP terminals are adapted automatically. The allocation of the subscriber data to the port numbers has to be adapted with AIMS:

5. Use AIMS to allocate the call numbers of the IP terminals to the new port numbers (CM_1_1_3_Subscriber) so the subscriber data can be re-assigned.
6. Check the configuration using AIMS and unlock the card (CM_1_4_5_AIP Cards, Setting "AIP Card On/Off").
7. Carry out a functional check.

5.7.4 Retrofitting an AIP card with DRS modules.

An AIP card can also be retrofitted with DRS modules:

1. Disconnect the PBX from the power supply.
2. Remove the AIP card as indicated in the Ascotel IntelliGate System Manual.
3. Fit the DRS modules.
4. Reinsert the AIP card as indicated in the Chapter "Fitting and Removing an AIP Card", page 36 and switch the PBX back on.

The DRS module is automatically detected by the system.

5.7.5 Initialization and Restart of the AIP Card

When the PBX is first initialised the AIP configuration data is also reset to its initialisation values. The IP addresses of the AIP card and the IP terminals are not reset.

During a PBX restart the AIP card is also re-initialized. The configuration data is retained.

A restart of the AIP card on its own can be obtained using AIMS (CM_1_4_5_AIP Cards).

6 Network Environment

This Chapter provides background information on the main network characteristics you need to take into consideration. It is assumed here that a network is already available.

Please note that the expertise of an experienced network engineer is crucial for optimising the network environment.

6.1 Network Requirements

As a result of the expansion of the Ascotel IntelliGate platform to the IP data network the network used becomes part of the Ascotel IntelliGate system. The communication quality therefore depends directly on the quality of service (QoS) and the network topology (in the same way as the road network influences the delivery quality of a haulage company). The general requirements are as follows:

- Ethernet 10 Base-T or 100 Base-T
- The use of switches rather than hubs
- Sufficient bandwidth

In other respects we recommend the use of all available methods for reducing the bandwidth and for ensuring a high quality of service(see the following chapters).:

6.1.1 Delay and Jitter

High delay and jitter values have a considerably detrimental effect on the quality of speech.
The delay values of the voice packets should be kept as small as possible. The following methods are used to reduce delay and compensate jitter:

- Prioritising voice packets over other data packets: See the Chapter ("Prioritising", page 42).
- Jitter management:
  The time fluctuation between the arrival of individual packets is controlled with a dejitter buffer in the Office 35IP and in the AIP 6350 and does not require any additional control in the network (see page 49, Tab. 28). Jitter management is time-critical. The greater the jitter buffer, the greater the delay values.

- Fragmentation of the IP packets:
  Large data packets increase the delay of waiting voice packets. If the packets are fragmented, prioritised voice packets can be sent between the packet fragments. Possible methods: MTU scaling, MCML-PPP (multilink-PPP).
- Frame length of the voice packets:
  The smaller the frame length of the voice packets is, the smaller the delay values generated, i.e. the greater the bandwidth requirement. For this reason we recommend that the frame length of AIP and Office 35IP be kept relatively small within the LAN area with a high bandwidth and relatively large for WAN connections with a short bandwidth (settings, see Tab. 28, page 49).

6.1.2 Bandwidth Management

The available bandwidth can be limited, especially on WAN links. The bandwidth control of AIP 6350 prevents call connections from being set up if there is too little bandwidth available (see "Bandwidth Control", page 43). The following methods help to reduce the bandwidth requirement:

- Voice compression:
  In the LAN area with sufficient bandwidth it makes sense to use a codec without compression (G.711) as the speech quality is better. Compressing codecs are used to advantage in WAN areas with limited bandwidth. See the Chapter "Bandwidth Control", page 43.
- Compressing the IP header:
  Voice packets are relatively small compared with their header (large overhead). On a point-to-point connection between 2 routers the 40 byte header can be considerably compressed. This means the resources of the available bandwidth can be used more sparingly. This setting is carried out in the router. Possible method: cRTP.

6.1.3 Security

Uncoded phone calls in the network can be recorded and played back using the appropriate equipment. For this reason it is preferable to use your own leased lines for WAN links or to encode the IP packets using for example VPN (Virtual Private Network).

For the port configuration of the firewall see the Chapter "Applications, Protocols and Ports", page 53.

6.2 Prioritising

If the IP network is to guarantee the bandwidth required for call connections, voice packets have to be given priority compared with other data packets.

The system supports the following prioritisation methods:

- Expanded IP frames as per IEEE 802.1p/Q (CoS, Layer 2):
  AIP and IP terminals use the prioritisation field in the expanded frame header to specify the priority. Prioritisation is effected in the switches. All the switches used must therefore support prioritisation as per IEEE 802.1p/Q and be configured accordingly for the method to be supported effectively.
- Type of Service (ToS, Layer 3):
  AIP and IP terminals use the ToS field (8 priority levels) of the IP header to specify the priority (tagging). Prioritisation is effected in the routers or in the Layer 3 switches. The routers used must therefore support ToS prioritisation and be configured accordingly. The router handles non-prioritised data packets with standard priority.

Both prioritisation methods can be used simultaneously.

Tab. 17: Prioritisation settings based on the example of the reference model

Parameters	**Parameter value[1)]**
CoS Priorisation	Off
CoS Priorisation Level	5 Interactive Media
ToS Priorisation Level	5 CRITIC_ECP
ToS Service Type	8 Low Latency

1) Here they all correspond to the initialisation values

The settings are effective for both the AIP and the IP terminals (see also page 49, Tab. 28).

6.3 Bandwidth Control

The maximum number of call connections possible simultaneously can be limited using AIMS to ensure that the maximum number of call connections set up does not exceed the available bandwidth.

The amount of bandwidth required by a call connection depends on the voice compression method. This method can be set for each individual IP terminal by selecting the correspond codec. The selected codec determines the bandwidth necessary for each call connection.

Tab. 18: Codecs supported and their bandwidth requirements

Codec	Bandwidth voice	Effective bandwidth (without IP header compression) in relation to the frame length			Speech quality
		10 ms	20 ms	30 ms	
G0.711	64 kbit/s	111 kbit/s	90 kbit/s	80 kbit/s	max. 4.5 MOS
G.729	8 kbit/s	55 kbit/s	32 kbit/s	24 kbit/s	max. 4 MOS
G.711 is uncompressed, has small delay values (provided a small frame length has been set) and a high speech quality (the MOS scale ranges from 1 to 5). This codec should be given priority whenever there is sufficient bandwidth available. If the bandwidth is limited, G.729 is used to advantage.					

As the bandwidth size available in the IP network is not the same everywhere, IP terminals can be grouped into areas with the same bandwidth. The number of call connections can be limited for each area. Once the limit is reached, no further connections are permitted. The caller will obtain the congestion tone.

Note:
To optimise the available bandwidth, the same codec should be used for IP terminals within a given bandwidth area.

Note:
Prioritised voice packets on a WAN link with tight design limits can slow down the data traffic to intolerable levels. For this reason sufficient bandwidth has to be included in the calculations when designing the maximum number of voice channels.

6.3.1 Bandwidth Control Based on the Reference Model

The following describes the procedure for defining codecs based on the example of the reference model and for setting up the bandwidth areas. An available bandwidth of 128 kbit/s is assumed as the measurement basis for the WAN link.

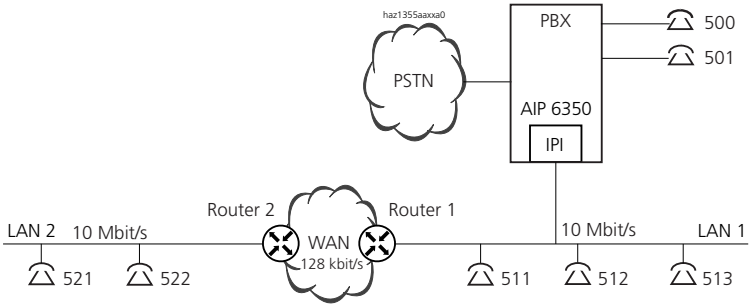


Fig. 11: Bandwidth resources based on the example of the reference model

Proceed as follows:

1. Divide the IP terminals into 2 areas (CM_1_4_5_Bandwidth Areas):
   – Area 1: IP terminals with call numbers 511, 512 and 513
   – Area 2: IP terminals with call numbers 521, 522
2. Specify the codec for the IP terminals in area 2.
   As there is only little bandwidth available between AIP and the IP terminals of area 2, G.729 and a frame length of 30 ms is a good choice (CM_1_4_5_IP Terminals).
3. Calculate how many voice channels can be open simultaneously over the WAN link:

   $$\frac{\text{128 kbit/s (WAN bandwidth)}}{\text{24 kbit/s (call channel with G.729 / 30ms)}} = \text{5 voice channels}$$

   This means that in the ideal case 5 voice channels can be open simultaneously. In real practical circumstances, however, 4 voice channels should be expected.
4. Limit the maximum possible number of voice channels for area 2 to 4 (the number of call connections that can then be set up over the WAN link is shown in Tab. 20, page 46).

5. Specify the codec for the IP terminals in area 1.
   As there is sufficient bandwidth available between AIP and the IP terminals of area 1, G.711 can be used with a frame length of 10 ms.
6. Calculate how many voice channels can be open simultaneously between AIP and the IP terminals:

$$\frac{\text{10 Mbit/s (LAN 1 bandwidth)}}{\text{111 kbit/s (call channel with G.711 / 10 ms)}} = \text{90 voice channels}$$

   In the maximum configuration with 4 fully equipped AIP cards the system supports 48 voice channels. This means that in area 1 the number of possible voice channels can be set to the maximum value 12.

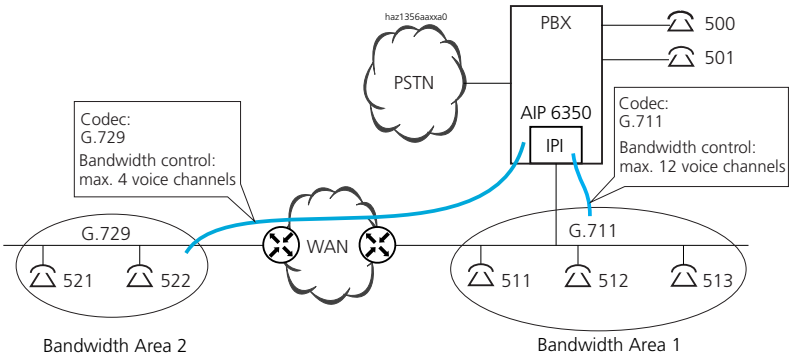


Fig. 12: Bandwidth control based on the example of the reference model

Tab. 19: Configuration of bandwidth control based on the example of the reference model

Parameters	Parameter value
IP terminal 511, 512 and 513: • Codec • Frame Length • Bandwidth Area	 G.711[1)] 10 ms 1
IP terminal 521 and 522: • Codec • Frame Length • Bandwidth Area	 G.729 30 ms 2
Bandwidth Area 1: • Name	 LAN 1

Parameters	Parameter value
• Voice Channels (max.)	12
Bandwidth Area 2: • Name • Voice Channels (max.)	 LAN 2 4

1) Corresponds to the initialisation value

Tab. 20: Number of possible call connections

Call connections	Channels required for each connection	Channels available	Possible connections
Between PBX and area 1	1	12	12
Within area 1	2	12	6
Between area 1 and 2 (via WAN link)	1	4	4
Within area 2	2	4	2

6.3.2 Static Routes

To be able to reach IP terminals in other LAN areas, you need to enter the IP address of the router via which the LAN area of the AIP is to be exited (default gateway).

With the aid of static routes you can define default gateways for each individual IP terminal or for groups of IP terminals.

If an IP terminal can be reached via several paths with different default gateways, a static route can be defined for each of the default gateways. AIP tries out the first Static route. If a connection is not obtained, it tries the next one.

Proceed as follows to set up the static routes:

1. Create a static route (AIP; CM_1_4_5_Static Routes).
2. Enter the IP address of an IP terminal or the address range for several IP terminals of a subnet (see Tab. 21).
3. Enter the subnet mask in accordance with Tab. 21.
4. Enter the address of the gateway via which the subnet is exited on the way to the destination subnet (default gateway).
5. Repeat the above steps for each static route. You can also define several static routes for the same IP terminals.

Tab. 21: Entering IP address ranges

Subnet mask	IP address	Address range
255.255.255.255	xxx.xxx.xxx.xxx	1 IP address
255.255.255.0	xxx.xxx.xxx.0	xxx.xxx.xxx.1 to xxx.xxx.xxx.254
255.255.0.0	xxx.xxx.0.0	xxx.xxx.1.1 to xxx.xxx.254.254
255.0.0.0	xxx.0.0.0	xxx.1.1.1 to xxx.254.254.254
0.0.0.0	0.0.0.0	1.1.1.1 to 254.254.254.254

Tab. 22: Static route settings based on the example of the reference mode, variant 1

Static route	IP address	Subnet mask	Default gateway
1	0.0.0.0	0.0.0.0	192,168,104,200 (router 1)
All the IP terminals will be searched for in their own subnet and everywhere behind the gateway. This is the most common and simplest variant.			

Tab. 23: Static route settings based on the example of the reference mode, variant 2

Static route	IP address	Subnet mask	Default gateway
1	192.168.111.0	255.255.255.000	192,168,104,200 (router 1)
IP terminals 521 and 522 will be searched for in the range from 192.168.111.001 to 192.168.111.254.			

Tab. 24: Static route settings based on the example of the reference mode, variant 3

Static route	IP address	Subnet mask	Default gateway
1	192.168.111.121	255.255.255.255	192,168,104,200 (router 1)
2	192.168.111.122	255.255.255.255	192,168,104,200 (router 1)
IP terminals 521 and 522 will be addressed dedicatedly.			

7 Annex

7.1 Overview of System Limits

Tab. 25: System limits

	Number (max.)	Remarks
AIP Cards	1 (Ascotel IntelliGate 2025) 2 (Ascotel IntelliGate 2045) 4 (Ascotel IntelliGate 2065)	AIP variants can be combined
IP AD2 interfaces per card	16 8 (Ascotel IntelliGate 2025)	Virtual interfaces without physical connection. Considered as AD2 interfaces by the PBX
IP terminals per interface	2	Connection MSN 1 and MSN 2 (virtual). Each connection can be assigned the IP address of an IP terminal.
IP terminals per card	16	On initialisation all MSN-1 connections are seized.
Voice channels active simultaneously	4/8/12	Depends on the DRS modules used. See Tab. 11
IP terminals per closed user group	4/8/12	The number of IP terminals registered with a closed user group must not exceed the number of available voice channels
CTI applications	First-party CTI is not supported	

7.2 Initialisation Values for IP Addresses

Tab. 26: Initialisation Values for IP Addresses

Address	**Initialisation values**
AIP card:	
• IP address	192.168.104.023
• Subnet mask	255.255.255.000
IP terminal:	
• IP address	192.168.104.033
• Subnet mask	255.255.255.000
• AIP address	192.168.104.023
• Gateway address	000.000.000.000

7.3 Reference of AIMS Parameters

Listed below are the parameters that can be viewed and modified using AIMS, together with a brief explanation.

Tab. 27: Legend

Symbols	Meaning
*	Initialisation value
(..)	Display, not modifiable
<..>	Expected input

Tab. 28: CM_1_4_5_IP Terminals

Parameters	Parameter values	Explanation
Call Number	(<Subscriber No.>)	Call number of the allocated subscriber
Name	(<Name>)	Name of the allocated subscriber
IP Address	<IP address>	IP address of the IP terminal
Codec	*G.711a G.711u G.729	G.711a uses the German tone signalling method; G.711u, the U.S. method. Setting valid for all call connections between this IP terminal and the AIP card.
Frame Length	*10/20/30 ms	Setting valid for all call connections between this IP terminal and the AIP card (see "Delay and Jitter", page 40).
Bandwidth Area	1 to 10	Assignment of the IP terminal to a bandwidth area
Enabled	(Yes/No)	An IP terminal can only be assigned once subscriber data has been created for a connection.
State	(Registered/Not Registered/ Upload/No Terminal	Shows the IP terminal's current status
Application SW Version	(<Software version>)	Indicates the version of the application software. To update the application software, see page 54
Boot SW Version	(<Software version>)	Indicates the version of the boot software

Tab. 29: CM_1_4_5_AIP Cards

Parameters	Parameter values	Explanation
Slot	(<Slot No.>)	Slot in which the current AIP card is located.
On/Off	*On/Off	Off: Card not active; assigned IP terminals unobtainable
State	(Barred/Prebarred/ In operation/SW Upload)	Indicates the current card status
SW Version	(Software version)	Indicates the card's software version
Active Voice Channels	(0 to 12)	Indicates how many voice channels are activ
MAC address	(<address>)	MAC address of the AIP card
IP Address	<address>	IP address of the AIP card. The card has to be restarted whenever the IP address is changed
Subnet Mask	<address>	Subnet of the AIP card. The card has to be restarted whenever the subnet mask is changed
Ethernet	*Autosense/10BaseT/ 100BaseT	Sets the AIP card and the IP terminals to the Ethernet connection type used.
CoS Priorisation	On/*Off	Activates Layer-2 prioritisation (see "Prioritising", page 42)
CoS Priorisation Level	0 Best Effort 1 Background 2 Standard 3 Excellent Effort 4 Streaming Multimedia *5 Interactive Multimedia 6 interactive Voice	Specifies the priority of the voice packets when CoS prioritisation is activated. Level 5 has to be set for a good speech quality. Setting is valid for AIP card and its IP terminals.
VLAN-ID	*1 to 4094	The AIP card and its IP terminals can be assigned to a virtual LAN (VLAN) or form such a LAN. The VLAN is identified by its ID. VLAN must be supported by all switches. Setting is valid for AIP card and its IP terminals.
ToS Priorisation Level	0 Best Routine 1 Priority 2 Immediate 3 Flash 4 Flash Override *5 Critical 6 Internetwork Control 7 Network Control	ToS IP Precedence: Specifies Layer-3 priority for the voice packets (see "Prioritising", page 42). Level 5 has to be set for a good speech quality. Levels 6 and 7 are reserved for the network administration and should not be used. Setting is valid for AIP card and its IP terminals.

Tab. 29: CM_1_4_5_AIP Cards (continuation)

Parameters	Parameter values	Explanation
ToS Service Type	0 Normal Service 2 High Reliability 4 High Throughput *8 Low Latency	Setting is valid for AIP card and its IP terminals.
Dejitter Buffer	Static *Dynamic	Dynamic: During the connection the buffer size is continually adapted to the network conditions. Minimum size as defined by the "Buffer Size" setting. Static: Fixed buffer size as defined by the "Buffer Size" setting. Setting valid for AIP card only. The dynamic dejitter buffer of the IP terminals does not have to be configured especially.
Buffer Size	0 to 250 ms; *60 ms	We recommend a maximum setting of 200 ms, otherwise the delay values become too high. Setting valid for AIP card only. The dynamic dejitter buffer of the IP terminals does not have to be configured especially.

Tab. 30: CM_1_4_5_Static Routes

Parameters	Parameter values	Explanation
Static Route	1 to 10	Reference number
IP address	<IP address>	Address of one or more IP terminals. For syntax see "Static Routes", page 46.
Subnet Mask	<Subnet mask>	Subnet or subnet area in which the routing destinations are located. For syntax see "Static Routes", page 46
Default Gateway	<IP address>	Gateway via which the subnet of the AIP card is exited on the way to the destination address.

Tab. 31: CM_1_4_5_Bandwith Areas

Parameters	Parameter values	Explanation
Bandwidth Area	1 to 40	Reference number
Name	<Name (max. 20 characters)>	Name of bandwidth area.
Voice Channels (max.)	1 to 12	Maximum number of voice channels open simultaneously

7.4 Permanent Network Parameters

The following parameters are set permanently and cannot be modified.

Tab. 32: Permanent parameters that cannot be set

Parameters	Parameter values
Silence Suppression	Off
Echo Cancellation	On

7.5 Applications, Protocols and Ports

The following table describes the applications, protocols and ports used by the host.

Tab. 33: Applications, protocols and ports used

	Application	Protocol Layer 4	Host 1		Direction	Host 2	
				Port			Port
Voice data	RTP	UDP	AIP	5004-5027	<->	IP terminal	30000
Signalling	AD2 TPKT	TCP	AIP	8065	<-	IP terminal	1024-1044
				60000-65000	->	IP terminal	8065
SW Upload AIP/IP terminal	FTP Control	TCP	FTP Server[1)]	21	<-	AIP/ IP terminal	60000-65000
	FTP Data	TCP	FTP server	20	->	AIP/IP terminal	60000-65000
Emergency SW Upload (Boot Loader)	TFTP Control	UDP	TFTP server	69	<-	AIP	1027
	TFTP Data	TCP	TFTP server	1024-2000	->	AIP	1027
Echo reply / request (ping)	ICMP 8/0	-	PC/AIP	-	<->	AIP/ IP terminal	-
Test with echo server[2)]	RTP	UDP	PC	5004-5027	<->	AIP/ IP terminal	7
Access via Telnet	Telnet	TCP	PC	1024-4000	->	AIP/ IP terminal	23

1) FTP server of the PBX or external FTP server

2) Used in connection with Traffic Monitoring Tools

7.6 Software Upload

This Chapter describes the software uploading procedure for AIP 6350 and Office 35IP.

AIP and IP terminals implement software which has to be adapted in the course of the product's further development (application software). The latest application software can be loaded on to the terminals using the AIMS Upload Manager.

7.6.1 Upload Process

The Upload process for IP terminals is described below. The Upload process for AIP cards follows the same pattern:

- Initialization phase:
  From the Upload Manager select the IP terminals to be loaded with the new application software. Start the Upload: the Upload Manager copies the software file to the PBX's FTP storage medium (Fig. 13; [1]) or to an external FTP server and initiates the Upload process on the first terminal [2].

- Execution phase:
  The IP terminal retrieves the software file from the FTP server of the PBX [3] or from an external FTP server, loads it into its memory [4] and restarts the terminal, which in turn activates the new application software.

- Monitoring:
  The Upload Manager checks and registers the Upload status during the execution phase; once one IP terminal has been fully updated, the Upload Manager triggers the same process for the next IP terminal.

The Upload is completed once all the IP terminals have been loaded with the new software and restarted.

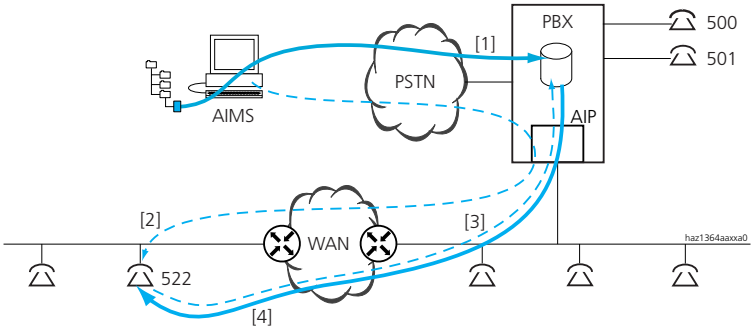


Fig. 13: Software Upload

7.6.2 Preparing the Upload

The following preparations have to be made before you start the Upload:

1. Make sure you inform all users of the time at which the upload is scheduled to be carried out as phone calls cannot be made or received while the new software is being initialised.
2. Use AIMS to make a backup of the configuration data prior to the Upload.
3. Deactivate the AIP cards (CM_1_4_5_AIP_Card, "On/Off=Off").

   If some connections are still active, the card will first be automatically pre-barred so that no new connections can be set up. As soon as all the connections are cleared down, the card is barred.

7.6.3 Uploading

To load different types of application software, first load the version for the PBX software, then the one for AIP, and finally the version for the IP terminals. In each case always wait until the current Upload is fully completed before initiating a new one.

Next load the IP terminals with a new application software. For this, use the PBX internal FTP server (normal case). The process for loading the AIP application software follows the same pattern and is not described separately.

The new software is supplied in the form of a Zip file. To load the IP terminals with the application software, proceed as follows:

Warning:
Make sure that during the Upload there is no interruption to the power supply either to the PBX or to the IP terminals.

1. Copy the zip file onto the PC using the Upload Manager or onto a drive in the network to which you have access with the Upload Manager.
2. Start the AIMS Upload Manager.
3. From the "Configuration" tab select the PBX, enter the password and configure the PBX connection as indicated in the Ascotel IntelliGate System Manual (Part 7, Operation and Maintenance).
4. Select the option "PBX as FTP Server".
5. Switch to the "IP Terminals" tab. The "Application Software" field displays the name of the file with the application software for the IP terminals.
6. From the list of available IP terminals select those you want to update.
7. Start the Upload by clicking "Upload".
8. You can check the progress and status of the Upload on the "Status" tab.

   The Upload is completed once all the IP terminals have been loaded with the new software and restarted.

   Once the Upload is completed the AIP cards are automatically reactivated and restarted.
9. On the "IP Terminal" tab check the software version and the following states for each IP terminal that was scheduled for the Upload:
   - "Status=Registered"
   - "Upload=Successfully Completed".

7.6.4 Uploading via an External FTP Server

The load process of the application software of the IP terminals from an external FTP server is described below. The process for loading the AIP application software follows the same pattern and is not described separately.

The new software is available in the form of individual files on an external FTP server. To load the IP terminals with new application software, proceed as follows:

Warning:
Make sure that during the Upload there is no interruption to the power supply either to the PBX or to the IP terminals.

1. Start the AIMS Upload Manager.
2. From the "Configuration" tab select the PBX, enter the password and configure the PBX connection as indicated in the Ascotel IntelliGate System Manual (Part 7, Operation and Maintenance).
3. On the "Configuration" tab deactivate the option "PBX as FTP Server".
4. Enter the IP address of the external FTP server, the user name and the access password.

Note:
For the IP address, always enter the complete address in the format "xxxx.xxxx.xxxx.xxxx". Alias (like e.g.. "pbx1.upload-center.ch") are not supported.

5. Switch into the tab "IP terminals" and enter in the field "application software" the path and the name of the file with the application software.
6. Start the Upload by clicking "Upload".

   The Upload is completed once all the IP terminals have been loaded with the new software and restarted.

   Once the Upload is completed the AIP cards are automatically reactivated and restarted.
7. On the "IP Terminal" tab check the software version and the following states for each IP terminal that was scheduled for the Upload:
   – "Status=Registered"
   – "Upload=Successfully Completed".

7.6.5 Upload Termination

The Upload is terminated if

- .. a predefined time limit (timeout) is exceeded,
- .. the FTP server cannot be accessed,
- .. the power supply is interrupted.

The timeout can be set separately for the IP terminals and the AIP cards in the "Options/Settings" menu in the Upload Manager. The time indication relates to the Upload process for an IP terminal or an AIP card.

The upload time required depends greatly on the network's transit rate. The initialisation values are set to an average value and may have to be adjusted.

Tab. 34: Measures following an Upload termination

Cause of the termination	Measures
Time limits exceeded	• Check to see if the time limits are set too low • On the "Status" tab check the progress of the Upload. This may help you to circumscribe possible sources of error.
No access to the FTP server	• Check the configured IP address of the FTP server and the password entered • Check to see whether the FTP server is functional
Power supply interrupted	• Try and repeat the Upload. In certain rare instances the AIP card may no longer respond. In such cases contact the Support.

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